U.S. Nat'l Museum
Proceedings
112-(3446)

Proceedings of the United States National Museum

SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Number 3446 1960 Volume 112, Pages 527–547

LIBRARY
JAN 25 1961
FISH & WILDLIFE SERVICE

# NOTES ON MYSIDACEAN CRUSTACEANS OF THE GENUS LOPHOGASTER IN THE U.S. NATIONAL MUSEUM

*By* O.S. TATTERSALL, D.SC.

Proceedings of
the United States
National Museum

SMITHSONIAN INSTITUTION · WASHINGTON, D.C.

Volume 112 1960 Number 3446

# NOTES ON MYSIDACEAN CRUSTACEANS OF THE GENUS LOPHOGASTER IN THE U.S. NATIONAL MUSEUM

*By* O. S. Tattersall, D. Sc.

The manuscript of U.S. National Museum Bulletin 201, "Review of the Mysidacea of the United States National Museum," by W. M. Tattersall, was completed in 1939 but, owing to wartime restrictions, was not published until Oct. 4, 1951. During the intervening 12 years, literature containing references relevant to Tattersall's work appeared and some systematic changes were introduced. The most important of these were contained in two beautiful "*Dana* Reports" (Nos. 19, 23) on the Lophogastrida collected by the *Dana* Expeditions (Fage, 1941; 1942). Of these two, only the second deals with the genus *Lophogaster*.

Interchange of literature at the time was impossible and, although Tattersall, who died in 1943, was aware that a 1940 publication by Fage contained preliminary diagnoses of certain new species of the genus *Lophogaster*, he never saw it or the subsequent *Dana* Reports.

When literature once more became available, it was evident that many amendments would have to be made to Tattersall's Bulletin 201 in order to bring it up to date with the time of its publication.

To this end Professor A. H. Banner (1954) of the University of Hawaii compiled a concise and very careful supplement enumerating additional records of known species and noting the foundation of new ones. Doubts concerning the systematics of any species arising as a result of these records were indicated, but their resolution was left until actual reexamination of the material could be carried out.

In the 1942 *Dana* Report, Fage established certain new criteria whereby species of the genus *Lophogaster* could be distinguished, and instituted a number of new species based on these specific characters. Tattersall had also founded new species in this genus but in his descriptions and figures had not mentioned the characters that Fage regarded as of specific significance.

As both workers dealt in some cases with material from the same localities, it seemed probable that some of the new species were synonymous. The question could only be answered by a reexamination of the material in the collections with which Tattersall had worked. This reexamination I was recently privileged to make at the U.S. National Museum of the Smithsonian Institution, in Washington, D.C. I wish to express my very great gratitude to Dr. Waldo L. Schmitt and to Dr. Fenner A. Chace, Jr., and his staff in the Division of Marine Invertebrates for all the help and kindness that they have given me during the course of this work and for all the facilities accorded me during my stay in Washington.

By the great kindness of Dr. Elisabeth Deichmann, of the Museum of Comparative Zoölogy, Cambridge, Mass., I have been allowed to examine paratypes of *Lophogaster longirostris* Faxon and have illustrated from them those characters set forward as specific by Fage. The illustrations supplement the original description of this species.

I am greatly indebted to Mr. Vernon E. Brock, Pacific Oceanic Fishery Investigations, for very kindly sending me material from Hawaiian waters for comparison with specimens in the collections of the U.S. National Museum. As a result, I am able to comment on Fage's species *Lophogaster schmidti* and to record it from the tropical central Pacific.

It has not been possible to obtain the types of *Lophogaster intermedius* Hansen, but I have examined specimens from the Mergui Archipelago, eastern Indian Ocean, which were referred to *intermedius* by Tattersall (1922), and have been able to compare them with the specimen from *Albatross* station 4944, referred doubtfully to this species by Tattersall (1951, p. 20).

## Genus *Lophogaster* M. Sars

*Lophogaster* M. Sars, 1857, p. 160.
*Ctenomysis* Norman, 1862, p. 151.

REMARKS: The genus *Lophogaster* is so homogenous and its generic characters so clearly defined that it can readily be distinguished from closely related genera of the suborder. On the other hand, the separation of its species has always presented great difficulty to the taxonomist because of the slight differences in their specific characters and of individual variation that may occur. As a result, there has been much confusion in the records of members of this genus in the past.

Differences between species lie not so much in the general form of the animals as in the degree of development of certain characters such as the length of the various spinous processes, the shape and relative length to breadth of the antennal scale and the number of denticles on its outer margin, the proportions and armature of the telson, and the amount of tuberculation or spinulation of the integument of the carapace.

Fage (1942, p. 5) noted that in most species of the genus, noticeable sexual differences occurred in some of these characters. Frequently the rostrum and sometimes other spinous processes became more elongated in larger females than in the males and young individuals. There is also a tendency for the number of spines arming the lateral margins of the telson to be greater in males than in females of the same species and for any tuberculation or spinulation of the carapace to be more pronounced in males.

Fage (1940, 1942), when reporting on the very rich collections of this genus made by the *Dana*, noted two characters which proved to be much more constant, and therefore much more useful as taxonomic guides, than those hitherto used. These characters were (1) the form of what he termed the "antennular scale" [1] (the lamellar prolongation from the inner region of the distal margin of the third segment of the antennular peduncle) and (2) the dorsal profile, in lateral view, of the wings of the carapace together with the size and direction of the posterolateral or alar spines, when these were present.

Specimens of *Lophogaster* have been recorded from various localities in all the tropical and warmer temperate waters of the world, including the Mediterranean and the Red Sea. Fage noted that animals showing a correspondence in the form of their spinous processes, and in his new characters, sufficient to justify placing them in separate

[1] As this platelike prolongation is in no way homologous with the antennal scale (which is the modified exopod of the antenna), it is perhaps confusing to call this structure a "scale." I have therefore used the word "lamina" for it throughout this work.

species were almost invariably confined within circumscribed and isolated geographical regions.

Investigation of the hydrography of these areas revealed that only very slight temperature variation occurred in them, and Fage suggested that this factor is the dominating one restricting the spread of the *Lophogaster* population. He advanced an interesting hypothesis to explain the sporadic distribution of the members of the genus and the restriction of each to its own isolated locality in the world today. He suggested that these isolated species represent the survivors from an ancestral form which in earlier epochs was widely spread throughout the world. Owing to an inability to tolerate changes of temperature, this early form died out in those regions in which, owing to geological changes, considerable variations in temperature occurred. Only in isolated areas where the temperature remained relatively stable did remnants of the old stock survive and in their enforced isolation evolve those combinations of small differences whereby they may be separated into species today.

There is much to commend this hypothesis. Certainly the geographical distribution is a most valuable guide for the identification of species, though one or two cases are known of more than one species occurring in the same area. The correlation of distribution with areas which have a small range of temperature is most striking. Where there is a horizontal spread in the range of a species, this spread is usually associated with the flow of warm or cooler ocean currents.

At the present time the genus includes 15 species, but the present research has convinced me that 2 of them are synonymous with 2 previously described species. The 13 remaining species are distributed as follows:

*Atlantic and Western Indian Oceans*

1. *L. typicus* M. Sars (1857): coastal waters of western Europe from southern Norway to the Bay of Biscay, west of Ireland; Mediterranean.
2. *L. subglaber* Hansen (1927): south of Spain off Cadiz and Gibraltar.
3. *L. spinosus* Ortmann (1906): tropical midsouth Atlantic and off Puerto Rico, the Bahamas, and between the Bahamas and the coasts of the Carolinas. These regions have the highest temperatures in the Atlantic of the Northern Hemisphere.
4. *L. longirostris* Faxon (1896, = *L. americanus* W. M. Tattersall, 1951): Gulf of Mexico, West Indies, and along the path of the Gulf Stream to the waters off Massachusetts.
5. *L. challengeri* Fage (1941): coastal waters off South Africa from Cape Town to Angola in the path of the Benguela Current.
6. *L. rotundatus* Illig (1930): off the Saya da Malha Bank, Central Arabian Sea; Straits of Zanzibar and off the coast of southeast Africa to Durban and Port Elizabeth along the path of the warm southward flowing Mozambique Current.
7. *L. affinis* Colosi (1930): Red Sea, northern and central region.
8. *L. erythraeus* Colosi (1930): south of the Red Sea near Bab el Mandeb.

*Pacific Ocean*

9. *L. pacificus* Fage (1940, = *L. japonicus* W. M. Tattersall, 1951): China Sea to north of Formosa and off the east and southeast coasts of Japan in the path of the warm Kuora-Shio Current, in habiting higher levels as the current flows northward.
10. *L. hawaiensis* Fage (1940): around Hawaii.
11. *L. intermedius* Hansen (1910): off the Moluccas, southeast of Celebes, off New Guinea, Mergui Archipelago, eastern Bay of Bengal.
12. *L. multispinosus* Fage (1940): off Fiji and Samoa.
13. *L. schmidti* Fage (1940): north of New Guinea, north of the Maluccas, south of Amboine, east of Ras Hafun.

### *Lophogaster longirostris* Faxon

FIGURE 1

*Lophogaster longirostris* Faxon, 1896, p. 164.—W. M. Tattersall, 1937, p. 1.—Fage, 1940, p. 327; 1942, p. 21.—W. M. Tattersall, 1951, p. 21.
*Lophogaster typicus* Ortmann, 1906, p. 23.
*Lophogaster americanus* W. M. Tattersall, 1951, p. 17.

REMARKS: This species was founded by Faxon on 20 specimens captured by the U.S. Coast Survey Steamer *Blake* in the Gulf of Mexico at 119 fathoms. The description, which I quote in full, is very brief: "Similar to *L. typicus* Sars but different in the great length of the medium spine of the rostrum which far surpasses the antennular peduncle and almost attains the tips of the antennal scales. There are 6 teeth along the outer edge of the antennal scale. Length 27 mm." The figure of the telson given by Faxon shows seven lateral spines on each lateral margin in addition to the long apical spine.

Ortmann (1906), when reporting on collections of *Lophogaster* from nine stations in the western Atlantic (three from the Gulf of Mexico, three off Key West, and three from off the coasts of the Carolinas), commented on the length of the rostrum and the variation displayed in the number of teeth arming the outer margin of the antennal scale and of the spines on the lateral margins of the telson. Because of much individual variation in these characters, he decided that they had no specific value and referred all the specimens to *L. typicus*.

Tattersall (1951) separated the *Lophogaster* material of the western Atlantic into two species: (1) *longirostris*, for those specimens occurring in the Caribbean and the Gulf of Mexico, and (2) a new species, *americanus*, for those taken off Key West and along the path of the Gulf Stream as far as the southern part of Massachusetts. In describing his new species, he enumerated the characters distinguishing it from *L. typicus* and especially stressed the fact that the integument of the carapace was minutely spinulose, but he made no detailed comparison between it and *longirostris*.

In reexamining the considerable numbers of specimens at present referred to these two species in the collections of the U.S. National Museum, I have failed to find any really constant characters upon which they can be separated. The form of the antennular lamina is almost precisely the same in all (fig. 1,*a,f*); the spinulation of the carapace is extremely difficult to make out and in a few instances does not correspond with the geographical distribution of the species as laid down by Tattersall. For instance, specimens from station

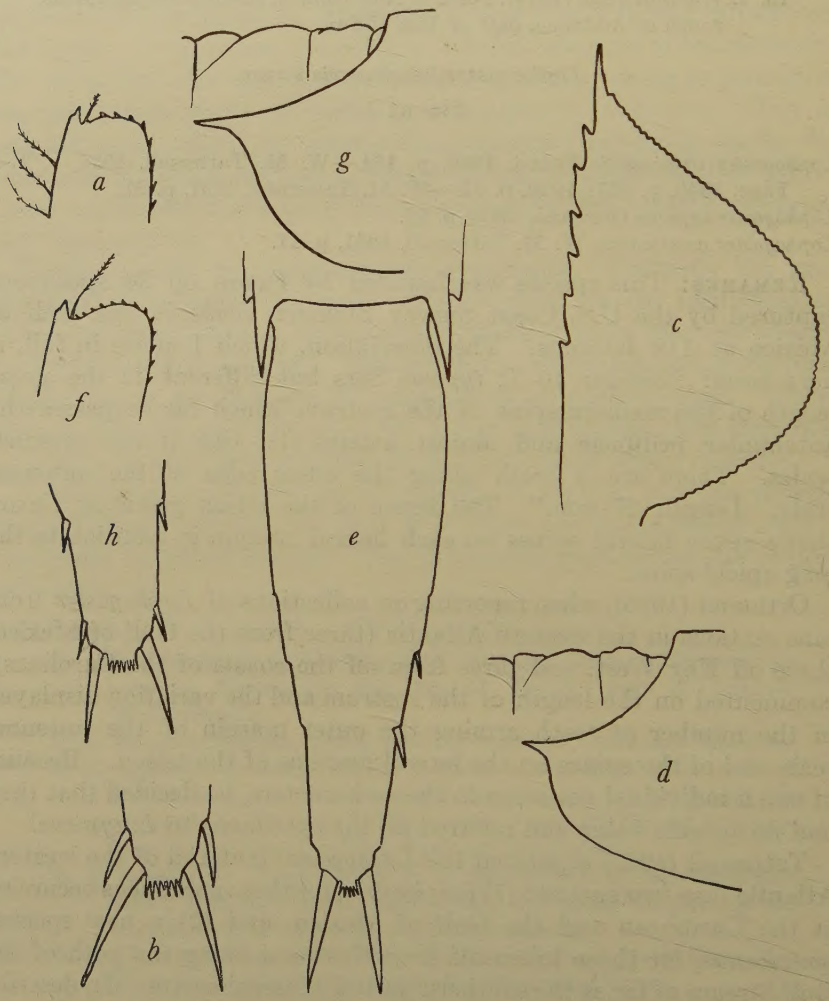


FIGURE 1.—*a–b, Lophogaster longirostris* Faxon, type: *a*, antennular lamina; *b*, apex of telson. *c–e, Lophogaster longirostris*, paratypes: *c*, antennal scale; *d*, wing of carapace; *e*, telson. *f–h, Lophogaster "americanus"* from *Albatross* station 2403: *f*, antennular lamina; *g*, wing of carapace; *h*, apex of telson. (Identified by W. M. Tattersall.)

2403 (in the Gulf of Mexico) are spinulose; on the other hand, I have been unable to find any trace of spinules on the integument in specimens from station 2314 (between Charleston and Savannah) and station 2418 (between Cape Charles and Savannah).

This character is not very satisfactory for specific purposes, for not only is it very difficult to see, but it varies with the size and maturity of the individual, the variance being more pronounced in the smaller forms. At some stations where several animals were taken in a haul, I found some spinulose and others apparently quite smooth.

The variation in the armature of the telson throughout the collections was most noticeable. Faxon's type of *longirostris* has seven lateral spines including the subapical ones on each side. In the paratypes, I found usually four, but in two cases there was an additional notch that might indicate a fifth spine lost or in the process of development. Tattersall's type of *americanus* had five, but in material from other stations identified as *americanus* by Tattersall and as *typicus* by Ortmann there are almost invariably four on each side including the subapical one.

After close examination of all the available material, I am of the opinion that there are insufficient grounds for the separation of *americanus* and that it should be regarded as a synonym of *longirostris*, whose description should be amplified as follows:

Carapace, integument smooth or more or less sparsely beset with microscopic, forwardly directed spinules, especially in the dorsal anterior region; rostral plate broadly tridentate with the central spine produced into a long acute rostrum extending beyond the antennular peduncle (rarely slightly shorter) but not extending to the tips of the antennal scales; usually relatively longer in the female; posterolateral angles produced into rather short acute spines.

Antennular lamina well developed with inner margin usually straight, armed with a close row of long, very fine setae and terminating in a strong tooth which extends very slightly beyond the apex; apex rounded, armed with a regular row of small spinules (fig. 1,*a*,*f*).

Antennal scale of the rotundate type but less broad than in *typicus;* outer margin armed throughout its length with from 6–8 strong teeth; apex acutely pointed, straight or very slightly incurved (fig. 1*c*).

Tergal spines from the last abdominal somite long and acutely pointed; from one-ninth to one-seventh as long as the telson.

Telson with lateral margins armed with 4–7 slender spines including the subapical pair; apical spines very long (may be as much as one-fourth of the telson in length) flanking a small apical plate bearing 5–8 small spinules (fig. 1,*b*,*e*,*h*).

### *Lophogaster intermedius* Hansen

FIGURE 2

*Lophogaster intermedius* Hansen, 1910, p. 14, figs.—W. M. Tattersall, 1922, p. 448 (not W. M. Tattersall, 1951,p. 20, as *L. intermedius* ?).

REMARKS: This species was founded by Hansen on specimens captured by the *Siboga* Expedition in the waters of the Dutch East Indies. It has unfortunately not been possible to examine the types of the species. A number of specimens from the Mergui Archipelago referred to *L. intermedius* (Tattersall, 1922, p. 448), however, agree so closely with Hansen's description and figures of this species that there can be little doubt as to the correctness of their identification. For the purpose of comparison, a figure showing the salient features of these specimens is given herewith (fig. 2.)

Tattersall (1951, p. 20) doubtfully referred an adult ovigerous female from station 4944 off the south east of Japan to *L. intermedius* and pointed out at the same time its close resemblance to other specimens from Japanese waters. He added that it might be merely a variety of his new species *L. japonicus* (=*L. pacificus* Fage). With this suggestion I concur, and I discuss characters and individual differences below under *L. pacificus* (fig. 3). I have examined a single specimen from station 4101 off Kauai, Hawaiian Islands, and find that it conforms very closely with the description and figures of *L. hawaiensis* (especially in the form of the antennular lamina). I suggest that it should be referred to this species. If I am correct in my interpretation of the identity of these two specimens, it will mean that *L. intermedius* is not represented in the collections of the U.S. National Museum.

### *Lophogaster pacificus* Fage

FIGURE 3

*Lophogaster pacificus* Fage, 1942, p. 29, figs.
*Lophogaster typicus*, Ortmann, 1906, p. 25 (Japanese specimens only).
*Lophogaster japonicus* W. M. Tattersall, 1951, p. 19, figs. 1*b*, 2*a*.
*Lophogaster intermedius* ? W. M. Tattersall, 1951, p. 20, fig. 1*c*.

REMARKS: Fage (1942, p. 29) founded the species *L. pacificus* on two nearly adult female specimens captured by the *Dana* in the China Seas to the north of Formosa. He mentioned that specimens from Japanese waters referred by Ortmann (1906) to *L. typicus* agreed in all respects with this new species except that there were fewer teeth arming the outer margin of the antennal scale—only three compared with the five to six in his types of *pacificus*.

One of the most outstanding characters of both *pacificus* and *typicus* is the presence of thickly scattered coarse tubercles on the carapace. In addition there is in *typicus* a strong, very noticeable, forwardly

FIGURE 2.—*Lophogaster intermedius* Hansen, from Mergui Archipelago: *a*, anterior end in dorsal view; *b*, antennular lamina; *c*, antennal scale; *d*, wing of carapace; *e*, telson; *f*, apex of telson.

545818—60——2

FIGURE 3.—*Lophogaster pacificus* Fage: *a*, anterior end, dorsal view; *b*, antennular lamina; *c*, antennal scale; *d*, wing of carapace; *e*, telson; *f*, apex of telson.

directed spine on each side posterior to the eye and just in front of the cervical sulcus. In *pacificus* this spine is replaced by a thick blunt protuberance.

Curiously, Ortmann made no reference to these characters when recording the Japanese specimens. A reexamination of his specimens reveals, however, that in these characters they agree precisely with *L. pacificus*, and Fage himself stated that they belong to this species.

Tattersall (1951) founded a new species, *L. japonicus*, on specimens captured by the *Albatross* in 1906 off the south of Japan and, at the same time, expressed the opinion that the Japanese specimens referred by Ortmann (1906) to *L. typicus* should be referred to it. The types of *japonicus* agree in every detail with Ortmann's material including the presence of only three teeth (or in one case only two) on the outer margin of the antennal scale.

After very close examination of all the material of *japonicus* in the collections of the U.S. National Museum—amounting to 13 ♂ and 7 ♀ (3 ovigerous)—I can find no other constant point of difference between these specimens from Japanese waters and the description and figures given by Fage of his types of *L. pacificus*. Since in other species of the genus the number of teeth arming the antennal scale is somewhat variable, I think that *L. japonicus* should be referred to the synonymy of *L. pacificus*.

In his description of *L. pacificus*, Fage did not mention any armature on the lobe from the anterior margin of the antennular peduncle. He simply stated, as one of the characters of the species, "écaile antennulaire largement déprimée au bord antérieur."

### *Lophogaster hawaiensis* Fage

FIGURE 4

*Lophogaster hawaiensis* Fage, 1942, p. 30, figs.
*Lophogaster typicus*, Ortmann, 1905, p. 967; 1906, p. 23 (Hawaiian specimens only).

OCCURRENCE: *Albatross* stations 3847, 3857, 3858, 3884, and 4101 situated in coastal waters around the Hawaiian Islands; two specimens taken at 43 m. but the remainder around 250 m. in depth.

REMARKS: This species very closely resembles *L. intermedius* in the presence of minute scattered nodules or microscopic blunt spinules on the carapace, in the length and shape of the rostrum, and in the shape and armature of the telson. It can be distinguished from *intermedius* by its relatively broader antennal scale with its somewhat convex outer margin and much more convex inner margin, by the characteristic concave anterior margin of the antennular lamina, and, if the specimens from the Mergui Archipelago can be taken as true *intermedius*, by the shorter and stouter alar spines.

It differs sharply from *pacificus* in lacking coarse tubercles on the carapace and in the complete absence of any postorbital spines or blunt processes, in the relatively shorter rostrum, in the shape of the anterior margin of the antennular lamina (figs. 3*a* and 4*a*), in the smaller horizontal alar spines, and in the presence of only one pair of spines on the lateral margins of the telson in addition to the subapical and apical spines.

In *intermedius*, *pacificus*, and *hawaiensis* the tergal spines from the last abdominal somite are almost obsolete.

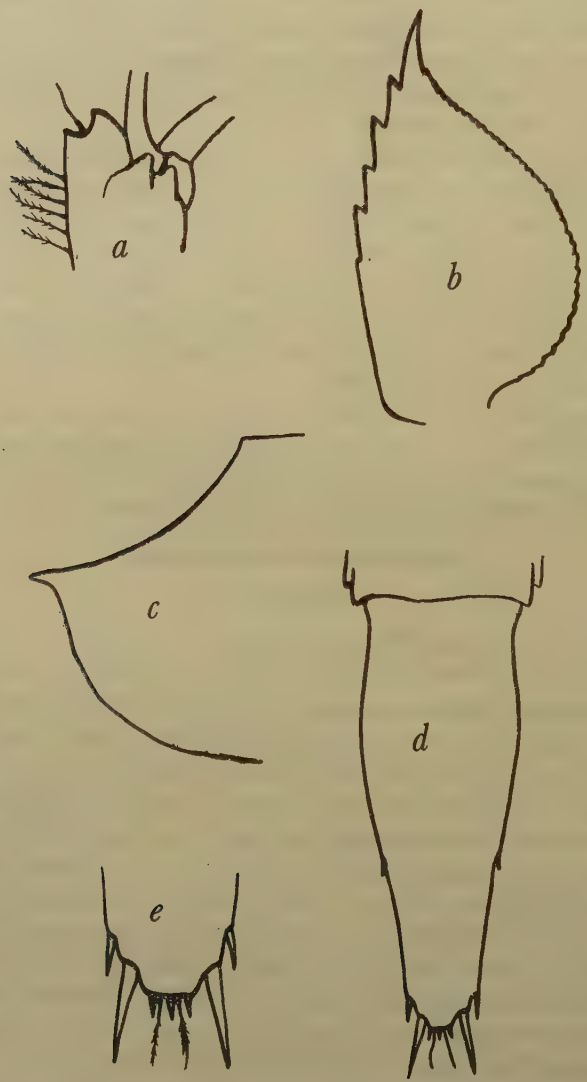


FIGURE 4.—*Lophogaster hawaiensis* Fage, from *Albatross* station 4101: *a*, antennular lamina; *b*, antennal scale; *c*, wing of carapace; *d*, telson; *e*, apex of telson.

A specimen in the collection from station 4101 and labelled *L. intermedius* resembles other specimens from this station so closely in all respects that it should be referred with them to *L. hawaiensis*. Most of the specimens in the collection are juvenile, but in those sufficiently mature for their sex to be ascertained, the rostrum is not invariably longer in the females than in the males. Possibly, this character develops only with maturity.

### *Lophogaster schmidti* Fage

FIGURE 5

*Lophogaster schmidti* Fage, 1940, p. 324; 1942, p. 34, figs.—O. S. Tattersall, 1955 pp. 44–45, figs.

OCCURRENCE: Station 3: cruise 32 of U.S. Fish and Wildlife Research Vessel *Hugh M. Smith*, 21°0′ N., 157°54′ W., Feb. 2, 1956 (night); *Isaac-Kidd* trawl, oblique haul approximately 500 m., 1 immature ♀, 10 mm. Station 9: cruise 30 of R/V *Hugh M. Smith*, 26°09′ N., 167°17′ W., Aug. 19, 1955 (night); *Isaac-Kidd* trawl, oblique haul approximately 550 m., 2 adult ♂, 20–25 mm., 1 immature ♂, 18.5 mm (damaged), 1 ovigerous ♀, 15.5 mm., 2 immature ♀, 14 and 15 mm.

REMARKS: These specimens agree remarkably closely with the published descriptions and figures of *L. schmidti* as follows:

The integument is quite smooth with no trace of spinules.

The rostral plate is rather narrow with the central spine long and slender; it extends in the males beyond the anterior margin of the antennular lamina and in the females to the level of the distal tips of the antennal scale (fig. 5*a*).

The eyes are comparatively small and are almost covered by the rostral plate in dorsal view exactly as in Fage's figure (fig. 5*a*).

The antennal scale is exactly similar in shape and proportions, but on the whole there are fewer teeth on the outer margin. One adult male and the ovigerous female had three–three and three–four respectively; one male had four–four; two immature females had four–five; and the small female from station 3 had five on one scale and six on the other. This character is evidently variable (fig. 5*c*.)

The profile of the dorsal margins of the "wings" of the carapace is evenly concave; the alar spines are long and slender and only slightly, if at all, directed upward (fig. 5*d*).

The tergal spines of the last abdominal somite are unusually long (fig. 5*e*).

The telson is long and narrow, nearly five times as long as its greatest width. Each lateral margin bears three extremely small spines in addition to the subapical spines that are themselves very

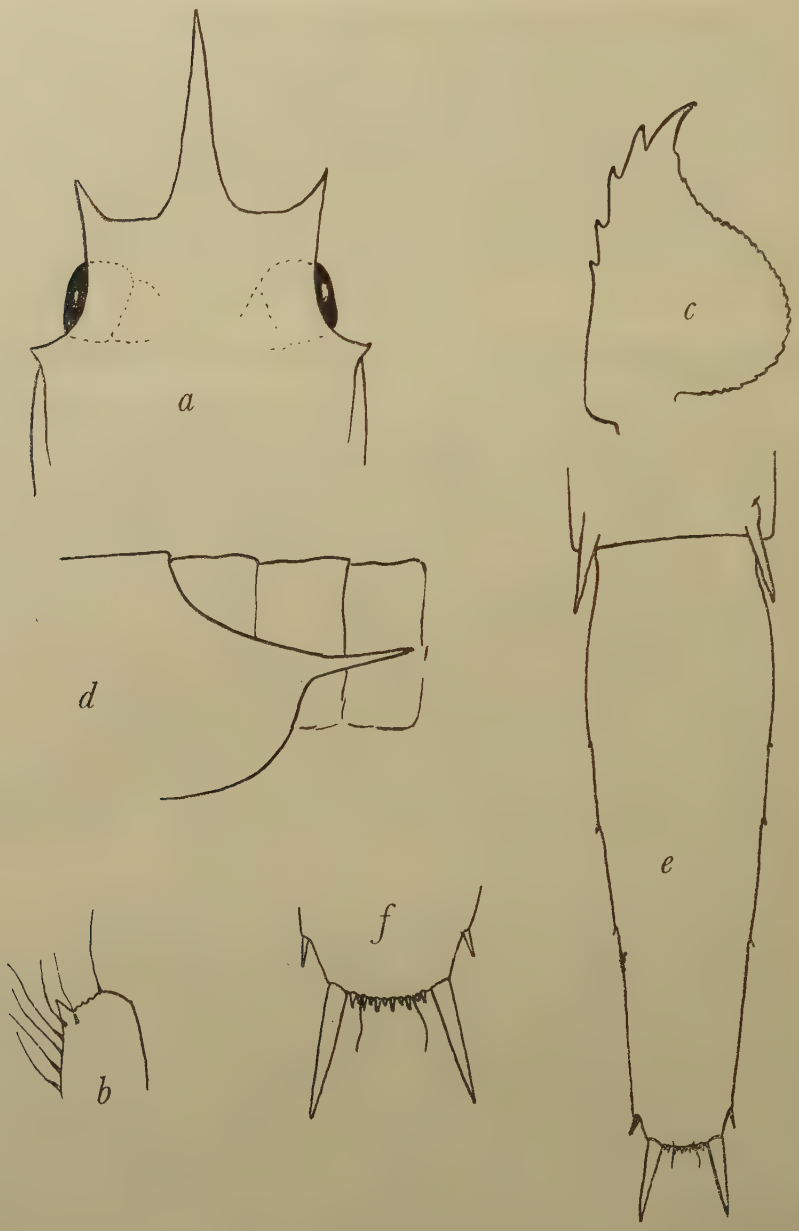


FIGURE 5.—*Lophogaster schmidti* Fage, from Hawaiian waters: *a*, dorsal view of rostral plate (adult female); *b*, antennular lamina; *c*, antennal scale; *d*, posterior region of carapace in lateral view; *e*, telson and posterior margin of last abdominal somite; *f*, apex of telson.

small and slender. Apical spines are long and strong. The apical plate is not produced at all and is armed with 9–13 spinules, which are usually uneven in size and consist of somewhat larger ones alternating with smaller ones in the spaces between them (fig. 5*f*).

In some of the specimens the proximal spine on each lateral margin is so small that only by the slight indentation of the margin at the point of its origin can one be led to see it. Fage mentioned a similar condition in his description of the types of *L. schmidti*.

These Hawaiian specimens are somewhat smaller than the types and paratypes collected by the *Dana*. The one ovigerous female in this collection was carrying advanced embryos, but it measures only 15 mm., whereas those of the *Dana* were from 17–20 mm. in length. Apart from this slight difference, the present specimens differ in only one character from the full description given by Fage (1942, p. 35)—the form of the lamina from the antennular peduncle. He made a strong point of the fact that in all his specimens the anterior margin of this lamina was evenly rounded and without teeth or spinules. The only armature he figured was a single slender simple seta in the middle of the apex. In all the Hawaiian specimens the inner margin ends in a strong tooth. The tooth is separated by a small concavity from the rounded apex, which extends only very slightly beyond it. From three to five very minute notches can be made out on the inner half of the apex, but the other half and the whole of the outer margin are completely smooth. In the immature specimens the inner margin and the inner half of the apex are adorned with a few regular very fine setae. It may be that the small notches seen on the margins of the older specimens indicate the positions from which setae had arisen and have subsequently been lost.

Fage considered that the form of the antennular laminae was of specific importance but, though differing in this particular character, the present specimens agree so very closely with *L. schmidti* in all other characters that they should be referred to this species. It may be that they represent a geographical race of *L. schmidti*.

If my diagnosis is correct, the geographical range of this species is considerably extended northward and eastward. The captures off Hawaii were made in precisely the same conditions as the captures from north and west of New Guinea (Fage) and the western Arabian Sea (O. S. Tattersall)—that is, the animals were pelagic in depths of not more than 550 m. from the surface over much greater depths. Possibly the species is widely distributed in similar conditions throughout the tropical Pacific.

The adult female described below as *Lophogaster* sp. B closely resembles *schmidti* in the form of the rostral plate, the length of the alar spines, and the armature of the lateral margins of the telson.

It differs in the armature of the antennular lamina, the shape of the antennal scale, the upward inclination of the alar spines, the fewer spinules arming the apex of the telson, and above all in the short poorly developed tergal spines from the last abdominal somite (fig. 7,*a*,*f*).

***Lophogaster* sp. A**

FIGURE 6

*Lophogaster* sp. ? W. M. Tattersall, 1951, p. 20, fig. 1*d*.

OCCURRENCE: *Albatross* station 4891, Ose Saki Light, Eastern Seas, 32°27′ N., 128°34′ W., 1 ♂, 20 mm.

DESCRIPTION: Tattersall (1951, p. 20) gave a brief description with a figure of the antennal scale of a single male specimen of *Lophogaster* captured by the *Albatross* off the south of Japan. The following supplementary description can now be given:

Carapace with the three spines of the frontal plate equal in length, lateral ones slightly incurved; posterolateral angles produced into short acute spines (fig. 6*c*).

Antennular lamina well developed; extending forward almost to the level of the apex of the antennal scale; inner margin slightly convex, armed with fine plumose setae and terminating in a very small tooth; anterior margin rounded, extending noticeably beyond the level of the tooth; margin finely crenate (fig. 6,*a*,*b*).

Tergal spines of the last abdominal somite very long and acutely pointed; about one-eighth of the telson in length (fig. 6*d*).

Telson with lateral margins armed with four very small spines and a pair of long slender subapical spines. The tips of both apical spines are broken off, but from what is left it is evident that they must have been very long. Apical plate short and broad, armed with eight spinules of which the median pair are extremely minute; a fine plumose seta arises on each side between the outermost spinule and the next (figs. 6,*d*,*e*).

REMARKS: In the form of the frontal plate, the shape of the antennal scale and the armature of the telson, this specimen resembles *L. typicus* but can at once be distinguished from it by the absence of tubercles and postorbital spines on the carapace, by the form of the anterior margins of the antennular laminae, by the well developed alar spines, and by the very long acute spines of the last abdominal somite.

It differs from the other Pacific species, *pacificus*, *intermedius*, and *hawaiensis*, in the shortness of the rostrum, in the rounded crenate anterior margin of the antennular lamina, in the small alar spines, in the long acute tergal spines; in the larger number of spines arming the lateral margins of the telson, and in the form and arrangement of the apical spinules (fig. 6*e*).

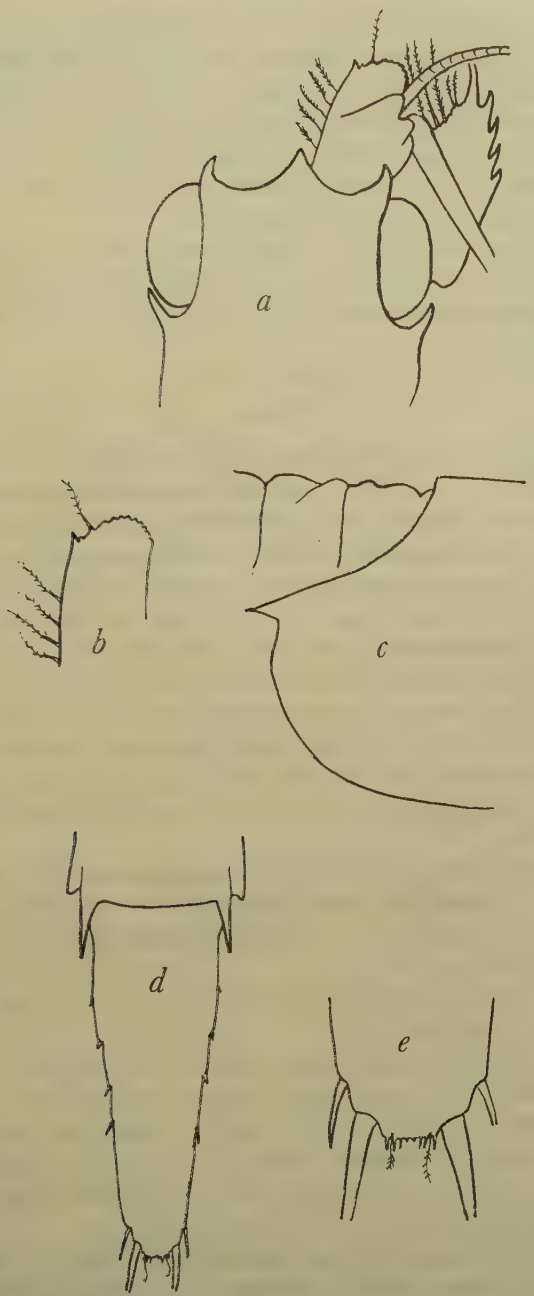


FIGURE 6.—*Lophogaster* sp. A from *Albatross* station 4891, south of Japan: *a*, anterior end in dorsal view; *b*, antennular lamina; *c*, wing of carapace in lateral view; *d*, telson; *e*, apex of telson.

The specimen shows some points of resemblance to *L. multispinosus* but differs in the somewhat shorter rostrum, in the rounded apex of the antennular lamina and, principally, in the relatively shorter and broader telson with the fewer lateral spines, and in the long slender subapical spines. Fage does not mention the form of the apical plate, but in his figure there are six spinules of equal size which are longer than any of those in the present specimen.

There seems to be no doubt that this specimen represents a new species; however, as it may not be fully mature and considerable changes may occur with growth, naming it would be unwise until more material is available.

***Lophogaster* sp. B**

FIGURE 7

OCCURRENCE: Albatross station 3965, vicinity of Laysan Island, Hawaii, 1 adult ♀ with fully developed but empty brood sac, 27 mm.

DESCRIPTION: Carapace with integument very sparsely beset with minute spinules; frontal plate rather broad; rostrum long, extending considerably beyond the antennular peduncle to the level of the tips of the antennal scales; wings with the ventral margin less convex than in other Pacific species; alar spines very long and acutely pointed, inclined obliquely upward in lateral view (fig. 7,*a*,*d*).

Antennular lamina with inner margin slightly convex, setose and terminating in a short, strong tooth; anterior margin convex, its apex barely extending beyond the tooth; armed with a regular row of minute spinules; apophyses from dorsal surface of peduncle unequal in size (fig. 7*b*).

Antennal scale twice as long as its greatest width, which occurs at about one-fifth of its length from its base and then tapers to a long acute apex; outer margin straight, armed with four teeth with a trace of a fifth (fig. 7*c*).

Tergal spines of the last abdominal somite small but well developed, acutely pointed (fig. 7*e*).

Telson less than three times as long as its greatest width; lateral margins armed with three small spines on each side in addition to the relatively small subapical spines; apical spines broken but appear from what remains to have been long and slender; apical plate not at all produced, armed with five regular spinules and two plumose setae (fig. 7,*e*,*f*).

REMARKS: This specimen was referred by Ortmann (1905; 1906) to *L. typicus* in company with a number of specimens from five other stations around Hawaii (3847, 3857, 3858, 3884, and 4101). Fage (1940) founded a new species, *L. hawaiensis*, for these specimens, and W. M. Tattersall (1951, p. 252), not having access to Fage's paper, briefly referred all specimens from Hawaiian waters to Fage's species. He

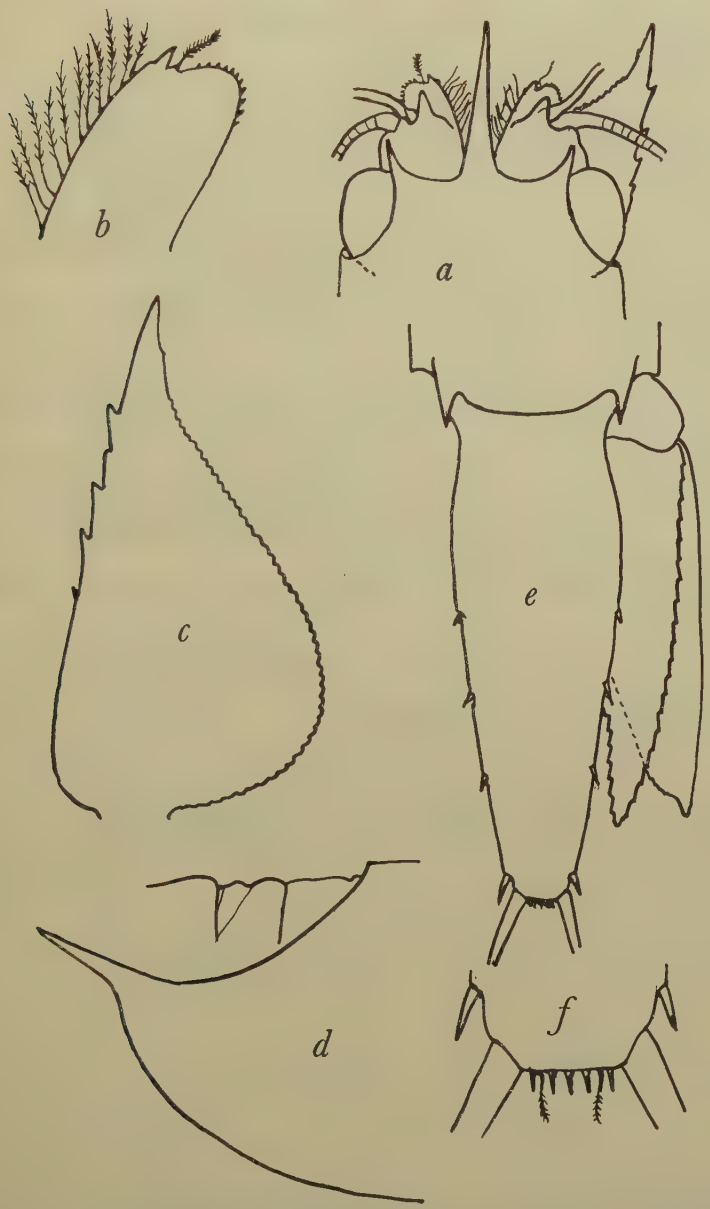


FIGURE 7.—*Lophogaster* sp B. from *Albatross* station 3965, from off Laysan Island, Hawaii: *a*, anterior end in dorsal view; *b*, antennular lamina; *c*, antennal scale; *d*, wing of carapace in lateral view; *e*, telson and right uropod; *f*, apex of telson.

noted that further examination of the material should be made when Fage's description became available.

Critical examination proves that all the specimens in the collections of the U.S. National Museum from Hawaiian waters, with the exception of the adult ♀ from station 3965, can without question be referred to *hawaiensis*. In every case the form of the antennular lamina and antennal scale, the shape and size of the alar spines, the almost complete absence of tergal processes from the last abdominal somite, and the armature of the telson are most consistent.

The specimen from station 3965, however, differs from *hawaiensis* as follows:

The rostrum is relatively much longer, the alar spines are very considerably longer, and the tergal spines (which are practically obsolete in *hawaiensis*) are well developed, though small.

The anterior margin of the antennular lamina has a tooth on its inner angle, separated by a small concavity from a rounded apex adorned with spinules, whereas in *hawaiensis* this margin is deeply concave and unadorned with spinules.

The antennal scale is longer and more slender and its outer margin is straight.

The telson is armed with three small spines on each side and a very short subapical spine, while in *hawaiensis* there is only one lateral spine in addition to the subapical one.

I am therefore unable to place this specimen into any of the known species and consider that in all probability it represents a new form, but since the genus exhibits so much individual variation, it would be unwise to found a new species on a single imperfect individual.

## Literature Cited


Banner, A. H.

1954. A supplement to W. M. Tattersall's review of the Mysidacea of the United States National Museum. Proc. U.S. Nat. Mus., vol. 103, No. 3334, pp. 575–583.

Colosi, G.

1930. Lophogastridi nuovi. Bol. Zool., Anno 1, No. 4, pp. 119–125, 4 figs.

Fage, L.

1940. Diagnoses préliminaires de quelques espèces nouvelles du genre *Lophogaster*. Bull. Mus. Nat. Hist., ser. 2, vol. 12, pp. 323–328.

1941. Mysidacea. Lophogastrida—I. *Dana* Report, No. 19, 52 pp., 51 figs.

1942. Mysidacea. Lophogastrida—II. *Dana* Report, No. 23, 52 pp., 42 figs.

Faxon, W.

1896. Reports on dredging . . . Gulf of Mexico and Caribbean Sea . . . . Supplementary notes on the Crustacea. Bull. Mus. Comp. Zool., vol. 30, pp. 153–166, 2 pls.

Hansen, H. J.

1910. The Schizopoda of the *Siboga* Expedition. *Siboga* Reports, vol. 37, pp. 1–123, 17 pls., 3 figs.

1927. Sergestides et schizopodes. Expéd. Sci. du *Travailleur* et du *Talisman*, 1880–1883, 26 pp., 1 pl.

Illig, G.

1930. Die Schizopoden der Deutschen Tiefsee Expedition. Wiss. Ergeb. Deutsch. Tiefsee Exped., vol. 22, pp. 400–625, 215 figs.

Norman, A. M.

1862. On the Crustacea, Echinodermata, and zoophytes obtained in deep-sea dredging off the Shetland Isles in 1861. Rep. British Assoc. Adv. Sci., vol. 31, 1861, pp. 151, 152.

Ortmann, A. E.

1905. Schizopods of the Hawaiian Islands collected by the *Albatross* in 1902. Bull. U.S. Fish Commission, 1903, pt. 3, pp. 961–973.

1906. Schizopod crustaceans in the U.S. National Museum. The families Lophogastridae and Eucopiidae. Proc. U.S. Nat. Mus., vol. 31, pp. 23–54, 2 pls.

Sars, Michael

1857. Omm 3 nye norske Krebsdyr. Forh. Skand. Naturf., vol. 7 (1856), pp. 160–175.

Tattersall, O. S.

1955. Mysidacea, *Discovery* Reports, vol. 28, pp. 1–190.

Tattersall, W. M.

1922. Indian Mysidacea. Rec. Indian Mus., vol. 24, pp. 445–504, 28 figs.

1937. New species of mysidacid crustaceans. Smithsonian Misc. Coll., vol. 91, No. 26, pp. 1–18, 10 figs.

1951. A review of the Mysidacea of the United States National Museum. U.S. Nat. Mus. Bull. 201, 292 pp., 103 figs.




U.S. GOVERNMENT PRINTING OFFICE: 1960